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**REFLECTIVE SHEET**

Patent Number: JP3193440  
Publication date: 1991-08-23  
Inventor(s): MANMOTO YOSHITAKA  
Applicant(s): HOKUSHIN:KK  
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Application Number: JP19890337780 19891225  
Priority Number(s):  
IPC Classification: B32B5/16; B32B3/14; B32B5/18; B32B7/02; B32B7/12; B32B17/04  
EC Classification:  
Equivalents:

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**Abstract**

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**PURPOSE:** To enable silk-like luster to be appeared, which reflects uniformly finely by dispersing and adhering predetermined glass beads on an adhesive layer formed on the surface of a foam with a thermoplastic resin composite, and putting them into a predetermined quantity foamed layer by pressing the adhesive surface thereof.

**CONSTITUTION:** On an adhesive layer 11 formed on the surface of a foamed layer 14 with a thermoplastic foaming resin composite, glass beads 13 of 1mm or below are dispersed and adhered, which become twice or less of the thickness of the foamed layer 14 in its particle diameter. And, the adhesive surface is pressed so that the one fourth or more of the glass beads in its particle diameter 13 is put into the foamed layer 14. In this way, the adhesive surface of the glass beads is the foamed layer 14 consisting of thermoplastic resin, and in a state of being plasticized, it is pressed into the gap between the glass bead 13 and glass bead 13, as a result, the glass beads are put into and adhered to the foamed layer 14, and do not show any feelings as foreign matters, and also do not drop therefrom in use. Accordingly, it can be laminated smoothly evenly by thrusting the glass beads 13 thereinto, thereby achieving excellent feelings and senses, and showing silk-like luster by reflecting smoothly finely, and thus it can also be adapted to decorative sheets such as wall materials (wall paper) and the like.

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DERWENT-WEEK: 199140

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TITLE: Reflective sheet mfr. for traffic  
signs - by spreading and bonding glass beads to adhesive  
layer on thermoplastic foam resin layer

PATENT-ASSIGNEE: HOKUSHIN CORP[HOKUN]

PRIORITY-DATA: 1989JP-0337780 (December 25, 1989)

PATENT-FAMILY:

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INT-CL (IPC): B32B003/14, B32B005/16 , B32B007/02 ,  
B32B017/04

ABSTRACTED-PUB-NO: JP 03193440A

BASIC-ABSTRACT:

Reflective sheet is prepd. by (a) spreading and bonding  
glass beads to an  
adhesive layer formed on the surface of a foam layer made  
of thermoplastic  
foamable resin compsn., the particle size of the glass  
beads being up to two  
times the thickness of the foam layer (14) and being below  
1 mm, and (b)  
pressing the glass bead bonding surface to embed the glass

beads into the foam  
layer to a depth of at least one-fourth of each glass bead.

The foam layer has a thickness of 0.5-2 mm and is made of  
polyurethane, PVC,  
ethylene - vinyl acetate, etc. resin. The adhesive layer  
is produced from  
polyurethane, PVC, vinyl acetate, etc. pastes or emulsions.

The glass beads  
are embedded by an embossing roll.

USE/ADVANTAGE - For wall materials, etc. The surfaces of  
the fine glass beads  
are evenly arranged and have a good gloss and good feeling  
to the touch.

CHOSEN-DRAWING: Dwg.0/2

TITLE-TERMS: REFLECT SHEET MANUFACTURE TRAFFIC SIGN SPREAD  
BOND GLASS BEAD  
ADHESIVE LAYER THERMOPLASTIC FOAM RESIN LAYER

DERWENT-CLASS: A32 A94 P73

CPI-CODES: A11-C01C; A12-L03; A12-R; A12-S04B;

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:

Key Serials: 0209 0231 0241 3155 0759 0787 0789 1294 2479

2488 3240 2496 2502

2504 2522 2536 2592 2654 2682 2698 2726 2736 2835 2851

Multipunch Codes: 014 034 04- 041 046 047 061 062 063 066

067 150 27& 330 395

397 436 443 446 466 468 477 491 502 516 521 53& 575 596 609

610 613 618 623 626

649 688 724

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CPI Secondary Accession Numbers: C1991-126171

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**Hei-Sei 3-193440**

Int. CL. 5 ID Code Office Cont'l No.

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(54) Name of the invention:

**Reflective Sheet**

(21) Filed Number: Application Hei-Sei 1-337780

(22) Filed Date: Hei-Sei 1 (1989) 12/25

(71) Patent Assignee: Hokushin KK

## **JP 3-193440**

*[Note: Names, addresses, company names and brand names are translated in the most common manner. Japanese language does not have singular or plural words unless otherwise specified by a numeral prefix or a general form of plurality suffix.]*

### **Description of the Invention**

#### **1. Name of the Invention**

### **Reflective Sheet**

#### **2. Scope of the Claims**

Reflective sheet characterized by the fact that on the surface of an adhesive layer 11 formed on the front surface of a foamed layer 14 obtained from a thermoplastic foaming resin composition material, glass beads, whose particle diameter is 1 mm or less and that becomes no more than 2 times the thickness of the foamed layer 14, or less, are dispersed, and adhered, and this bonding surface is pressed and at least 1 or more segments of the 4 segments of the particle diameter of the glass beads 13 become buried inside the foamed layer 14.

#### **3. Detailed Explanation of the Invention**

##### **(Technical Field of Application)**

The present invention is an invention about a reflective sheet that can be used as a wall decorating material that is glued on the surface of indoor room walls, or as a reflective material that is glued on electrical poles or signs etc.

##### **(Prior Technology)**

The reflective material formed as glass beads are arranged on the front surface of a substrate material has been used in the past in road signs etc., and most recently the method has been also used where the cut off (transverse) side of the reflective sheet where glass beads with a fine diameter have been dispersed and bonded, is adhered on signs etc., and this type of improved technology has been disclosed in the Japanese patent Application Laid Open Number Showa 54-152513, Japanese Patent Application Laid Open Number Showa 54-152514 (Japanese Patent Report Number Showa 58-46704), Japanese Patent Application Laid Open Number Showa 62-22821, etc.

##### **(Problems Solved by The Present Invention)**

The longitudinal stacking and orderly individual arrangement of glass beads with a large particle diameter (spheres) is easy, however, as the particle diameter becomes smaller

(finer) together with that that becomes more difficult, and in the case when the particle diameter is 1 mm or less, such regular arrangement of the powder like glass beads becomes practically impossible.

Because of that for the preparation of reflective sheet where small diameter glass beads have been layer laminated on the front surface the method is used whereby a large amount of glass beads is dispersed on the surface of a base sheet that has been coated with an adhesive agent, and it is said that the falling off of the upper layer part excess glass beads that are not bonded in the adhesive agent layer is eliminated.

However, according to this method it is easy to generate the problem that gaps that are slightly smaller than the particle diameter of the glass beads are generated in the space between the glass beads adhered on the base sheet and the glass beads.

According to the well known in the past technology described in the earlier Japanese Patent Application Laid Open Number Showa 54-152514 (Japanese Patent Report Number Showa 58-46704), in order to solve such unfavorable condition the admixing of glass beads with a small and large, different diameters, has been used, and glass beads with a small particle diameter were inserted inside the gaps between the large particle diameter glass beads and the glass beads, where that was possible, and by that the exposed gaps of adhesive agent were eliminated.

However, the dispersed glass beads, after their adhesion onto the base sheet that has been coated with the adhesive agent, almost cannot be transferred and they are fixed in the state as they are, and also, there is almost no order and arrangement mutually between the dispersed twinkling glass beads with small and large different diameters, and because of that even in the case of the admixing of such small and large different particle diameter glass beads and dispersing, it is not possible to achieve adhesion without any gaps, and even though the large glass beads are arranged and orderly, it is impossible to bury the gaps that originate around the small glass beads.

Then, the method has also been used where the bonding agent is foamed etc., and it is coated at a thickness that is the same as or larger than the particle diameter of the glass beads, and glass beads are dispersed as a thick laminated layer that becomes a layer on the coated layer of the bonding agent, and the excess glass beads 13' that are stacked on the top of the glass beads 13 of the bottom most layer that is bonded to the base sheet protrude from the space between the glass beads 13 of this bottom most layer and they are bonded by the bonding agent.

However, in the case of this method, it is a material where there are no gaps of exposed base sheet 12 between the glass beads and the glass beads 13' that are on the top protruding and stacked on the surface of the glass beads 13 are easily removed and fall off by rubbing, and the glass beads 13 of the bottom most layer that is adhered onto the base sheet, which have a different light reflection behavior are exposed or foreign material is adhered and the appearance is changed, and consequently, a reflective sheet

where the glass beads are evenly arranged so that they provide fine reflection is not obtained.

### **(Goal of the Present Invention)**

The present invention is an invention that has as a goal to solve the above described unfavorable circumstances and to obtain a silk like gloss possessing reflective sheet where extremely fine glass beads are evenly arranged and adhered without gaps so that they provide fine reflection.

### **(Structure of the Invention)**

Namely, the reflective sheet 15 according to the present invention is characterized by the fact that on the surface of an adhesive layer 11 formed on the front surface of a foamed layer 14 obtained from a thermoplastic foaming resin composition material, glass beads, whose particle diameter is 1 mm or less and that becomes no more than 2 times the thickness of the foamed layer 14, or less, are dispersed, and adhered, and this bonding surface is pressed and at least 1 or more segments of the 4 segments of the particle diameter of the glass beads 13 become buried inside the foamed layer 14.

Regarding the foaming layer 14, it is a good option if it is formed from polyurethane resin, vinyl chloride resin, ethylene vinyl acetate resin etc., coated at a thickness in the range of 0.5 ~ 2 mm, and at the time when the reflective sheet 15 is used as a wall decorating material (wall paper), a base sheet 12 is used that is obtained as a layer is coated and laminated on the surface of a backing paper 16.

The binder agent layer 11 can be obtained as a paste or emulsion of polyurethane, vinyl chloride, vinyl acetate, ethylene – vinyl acetate etc., is coated and layer laminated.

However, in the case when glass beads 13 are dispersed in the foaming resin composition coated on the surface of the backing paper 16, whose surface is not completely fixed and which possesses viscous properties, or in the case when the front surface of the foamed later 14, which is formed on the heat melting resin like vinyl chloride resin etc., is heated and melted and the glass beads are dispersed, the coating of the adhesive agent 11 becomes unnecessary.

Namely, according to the present invention, the term “adhesive layer 11” has the meaning of one part of the front surface of a foamed layer possessing adhesive properties, and it is formed as an adhesive agent is coated and also so that the thickness of the coated layer being in the range of 0.05 ~ 0.5 mm, it is extremely thin, and so that this coated layer does not become thicker than the thickness of the particle diameter of the glass beads 13.

Regarding the glass beads 13, these are admixed and combined and dispersed (sprayed) in an adhesive agent and a large amount of this is dispersed on the front surface of the adhesive properties possessing foamed layer 14 and it is stacked multiple times so that it



becomes a thick laminated layer, and the excess glass beads of the top layer part that is not in contact with the foamed layer 14, after that simply fall off and are regenerated.

In the case when without coating an adhesive agent glass beads 13 are dispersed on the front surface (11) of the adhesive properties possessing foamed layer 14, the glass beads are dispersed as the foamed layer 14 is melted and softened so that the glass beads 13 become buried and incorporated and so that it is in a state where it does not have flowing properties.

For the glass beads 13, a material is used where the particle diameter is in the range of 0.05 ~ 1 mm, and preferably, it is in the range of 0.1 ~ 0.5 mm, and the thickness of the foamed layer 14 is made to be 1 or more parts relative to 2 parts of the glass beads particle diameter.

After the dispersing of the glass beads 13, as the foamed layer 14 is in a heated and softened state, it is passed on an embossing roll, etc., and the glass beads 13 are buried inside the foamed layer 14 and strongly fixed and adhered.

Consequently, regarding the adhesion state of the glass beads 13 immediately after the dispersing, it is also a good option if they are adhered so that they in small degree of contact on the front surface of the foamed layer 14 to the level where they are not falling off.

#### **(Effect)**

Regarding the glass beads 13 that are adhered on the foamed layer 14, immediately after their dispersing they move only insignificantly on the surface of the foamed layer 14, and through their insignificant movement the adhesive agent that is adhered on the front surface of the glass beads 13 is slightly adhered onto the glass beads that are in contact above it.

A large part of such glass beads that are slightly adhered on the front surface of the glass beads 13 falls off and they are recycled, however, there are the glass beads 13 that are adhered to the base sheet and the relatively large gaps in the space between the glass beads 13, however even though these are such slightly adhered glass beads because of the fact that they are supported in between the glass beads 13, it is difficult for them to fall off and thus they are not eliminated.

In the past, in the case of such glass beads 13' (Figure 2), they were a material that fell off from the surface of the reflective sheet during use and it was lost as a thrown away foreign material with a high cost, however, in the case according to the present invention, the bonding surface of the glass beads is a foamed layer 14 that is formed from a thermoplastic resin and in its heated and plasticized state the glass beads 13 and the gaps between the glass beads are pushed and incorporated into the foamed layer 14 and they are adhered, and a foreign matter appearance is not acquired and there is no falling off of the glass beads during the use.

## **(Results From the Invention)**

As described here above, according to the present invention, the adhesive surface 11 where the glass beads 13 are dispersed is a foamed layer 14 that is formed from a thermoplastic resin material, and because of that it is possible to orderly arrange fine glass beads with a particle diameter of 1 mm or less and bury them in that layer and by that obtain an even laminated layer, and by that it is possible to obtain a high product value reflective sheet 15 that has a good touch feeling, that has a fine reflection, that has a silk like gloss, and that can also be used as a wall decoration material (wall paper) etc., decorative sheet material.

### **4. Brief Explanation of the Figures**

Figure 1 represents an enlarged sectional view of the reflective sheet according to the present invention. Figure 2 represents an enlarged sectional view of a reflective sheet according to the previous technology.

- 11.....adhesive agent (layer)
- 12.....base sheet
- 13.....glass beads
- 14.....foamed layer
- 15.....reflective sheet
- 16.....backing paper

**Patent Assignee: Hokushin KK**

## ⑫ 公開特許公報(A) 平3-193440

⑤Int.Cl.<sup>5</sup>

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⑬公開 平成3年(1991)8月23日

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審査請求 未請求 請求項の数 1 (全3頁)

⑭発明の名称 反射シート

⑯特 願 平1-337780

⑰出 願 平1(1989)12月25日

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## 明 細 書

## 1. 発明の名称

反射シート

## 2. 特許請求の範囲

熱可塑性発泡樹脂組成物による発泡層14の表面に形成した接着層11の上に、粒径が発泡層14の厚みの2倍以下となる1 $\mu$ m以下のガラスビーズ13を散布接着し、その接着面を押圧してガラスビーズ13の粒径の4分の1以上の部分を発泡層14の中に埋め込んだことを特徴とする反射シート。

## 3. 発明の詳細な説明

(産業上の利用分野)

本発明は、屋内外の壁面に貼る壁装材、或は、電柱や標識等に貼る反射材等として使用される反射シートに関するものである。

(従来の技術)

基材表面にガラス球体を配列した反射材は道路標識等に古くから使用されており、近時は粒径の細かいガラスビーズを散布接着した反射シートの截断片を標識等に貼付すると言う方法も採られ、

この種の改良技術に関しては実開昭54-152513、実開昭54-152514(実公昭58-46704)、実開昭62-22821等に関示されている。

(発明が解決しようとする問題点)

粒径の大きいガラスビーズ(球体)を縦横揃えて1個ずつ整然と配列することは容易であるが、粒径が細くなるにつれて難しくなり、粒径が1 $\mu$ m以下で粉末状の細かいガラスビーズをその様に整然と配列することは實際上不可能である。

このため粒径の細かいガラスビーズの表面に積層した反射シートを得るには、接着剤を塗布したベースシートの上にガラスビーズを多量散布し、接着剤層に接着しない上層部の余分のガラスビーズを脱落除去すると言う方法で作られる。

しかしこの方法では、ベースシートに付着し接着したガラスビーズとガラスビーズの間には、それらのガラスビーズの粒径よりも稍々小さい隙間が出来易い。

前掲の実開昭54-152514(実公昭58-46704)に係る従来公知技術は、かかる不都合を解消するた

め粒径の大小異なるガラスビーズを混合使用し、粒径の大きいガラスビーズとガラスビーズの間に出来る隙間の中に粒径の小さいガラスビーズを入り込ませ、それによって接着剤の露出する隙間を出来ない様にしようとするものである。

然るに、散布したガラスビーズは接着剤を塗布したベースシートに付着してから殆ど移動せずそのまま固着されるものであり、又、散布した瞬間大小異なるガラスビーズが交互に整然と並ぶことは殆どあり得ないので、その様に粒径の大小異なるガラスビーズを混合して散布しても隙間なく接着することは出来ず、仮令大きいガラスビーズが整然と並んだとしても細かいガラスビーズの間に出来る隙間を埋めることは出来ない。

そこで接着剤を泡立てる等してガラスビーズの粒径と同じかそれ以上に厚く塗布し、ガラスビーズが接着剤の塗布層の上に幾層にも重なり合って厚く積層する様に過剰散布し、ベースシートに接する最下層のガラスビーズ13の上に重なった余分のガラスビーズ13'を、その下の最下層のガラス

ビーズ13の間から食み出た接着剤によって接着させると言う方法が保られる。

しかしこの方法では、ガラスビーズの間からベースシート12の露出する隙間はなくなるものの、ガラスビーズ13の上に重なって突き出た上のガラスビーズ13'は、擦られて脱落し易いものであるし、ベースシート12に密着した最下層のガラスビーズ13とは光の反射具合も異なり、異物が付着したかの観を呈し、従ってガラスビーズが平に揃って一様に細かく反射する反射シートは得られない。  
(発明の目的)

本発明は、かかる不都合を解消し、極く細かいガラスビーズが隙間なく平らに揃って接着されて一様に細かく反射する絹様光沢のある反射シートを得ることを目的とする。

(発明の構成)

即ち本発明に係る反射シート15は、熱可塑性発泡樹脂組成物による発泡層14の表面に形成した接着層11の上に、粒径が発泡層14の厚みの2倍以下となる1mm以下のガラスビーズ13を散布接着し、

その接着面を押圧してガラスビーズ13の粒径の4分の1以上の部分を発泡層14の中に埋め込んだことを特徴とするものである。

発泡層14は、ポリウレタン樹脂、塩化ビニル樹脂、エチレン酢ビ樹脂等で0.5～2mmの厚みに形成するとよく、反射シート15を壁装剤(壁紙)に用いるときは裏打紙16の上に塗布積層したベースシート12を用いる。

接着層11はポリウレタン、塩化ビニル、酢酸ビニル、エチレン酢酸ビニル等のペーストやエマルジョンを塗布して積層することが出来る。

しかし、裏打紙16の上に塗布した発泡樹脂組成物14が完全に固化せず表面が粘着性を帯びている中にガラスビーズ13を散布する場合や、塩化ビニル樹脂等の熱溶解性樹脂に成る発泡層14の表面を加熱溶解させてガラスビーズ13を散布する場合には接着剤11を塗布する必要はなくなる。

即ち本発明に言う「接着層11」とは、接着性を帯びる発泡層の一部表面を意味し、接着剤を塗布して形成するとしても塗膜が0.05～0.5mmと極く

薄くし、その塗膜がガラスビーズ13の粒径よりも厚くならない様にする。

ガラスビーズ13は、接着剤に混ぜ合わせて散布(吹き付け)せず、接着性を帯びた発泡層14の表面に幾重にも重なって厚く積層するように多量に散布し、発泡層14に接しない上層部の余剰のガラスビーズはその後離れ落として回収する。

接着剤を塗布せず粘着性を帯びた発泡層14の表面(11)にガラスビーズ13を散布する場合には、発泡層14がガラスビーズ13が沈み込む程に溶融軟化し流動性を帯びない状態において散布する。

ガラスビーズ13には粒径が0.05～1mmの、好ましくは0.1～0.5mmのものをを用い、発泡層14の厚みはその粒径の2分の1以上にする。

ガラスビーズ13の散布後、発泡層14の加熱軟化状態においてエンボスロール等に通し、ガラスビーズ13を発泡層14の中へと埋め込んで強固に接着させる。

従って散布直後のガラスビーズ13の接着具合は、脱落しない程度に発泡層14の表面に僅かに点接触

して辛うじて接着している程度であってもよい。

(作用)

発泡層14に付着したガラスビーズ13は、その散布直後発泡層14の上を僅かに転がるものであり、その僅かな転動によってガラスビーズ13の表面に付着した接着剤は、その上に接するガラスビーズを微かに接着する。

その様なガラスビーズ13の表面に微かに接着したガラスビーズの多くは爾後脱落し回収されるものであるが、ベースシートに接着したガラスビーズ13とガラスビーズ13の間に出来た比較的大きい隙間の出来るところでは、その様に微かに接着したガラスビーズでもベースシートに接着したガラスビーズ13とガラスビーズ13の間に挟持されるので脱落し難く除去されない。

従来その様なガラスビーズ13' (第2図) は、商品価値を損なう異物として扱われ使用中に反射シートの表面から脱落してしまうものであるが、本発明ではガラスビーズの接着面が熱可塑性樹脂に成る発泡層14であり、その加熱可塑化された状

態においてガラスビーズ13とガラスビーズ13の間隙の中へと押し込まれ発泡層14に埋め込まれて接着し、異物感を呈さず使用中に脱落しない。

(発明の効果)

以上説明した通り本発明では、ガラスビーズ13を散布する接着面11が熱可塑性樹脂に成る発泡層14であるので、整然と配列し難い粒径1mm以下の細かいガラスビーズ13でもその中に押し込んで整然と平らに積層することが出来、それによって手触りがよく、一様に細かく反射し絹様光沢を呈し、壁装材(壁紙)等の化粧シートにも使用し得る商品価値の高い反射シート15を得ることが出来る。

#### 4. 図面の簡単な説明

第1図は本発明に係る反射シートの拡大断面図、

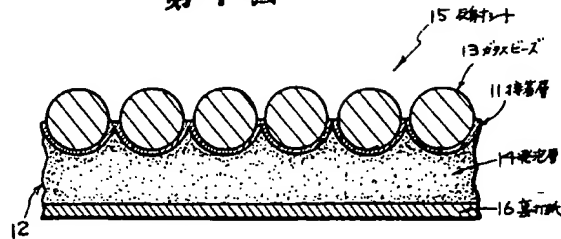
第2図は従来の反射シートの拡大断面図である。

- |            |            |
|------------|------------|
| 11…接着剤(層)、 | 12…ベースシート、 |
| 13…ガラスビーズ、 | 14…発泡層、    |
| 15…反射シート、  | 16…裏打紙。    |

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第1図



第2図

